Educating Maritime Engineers for a Globalised Industry

Nielsen, Ulrik Dam

Publication date:
2013

Document Version
Publisher's PDF, also known as Version of record

Educating Maritime Engineers for a Globalised Industry

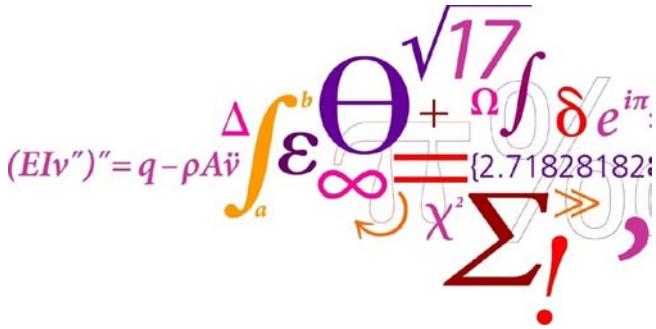
(Extractions from Andersen and Nielsen; 2012)

Ulrik Dam Nielsen, associate professor

NMU-DNV Workshop

West Pomeranian University of Technology, Szczecin, Poland

24-25 January 2013

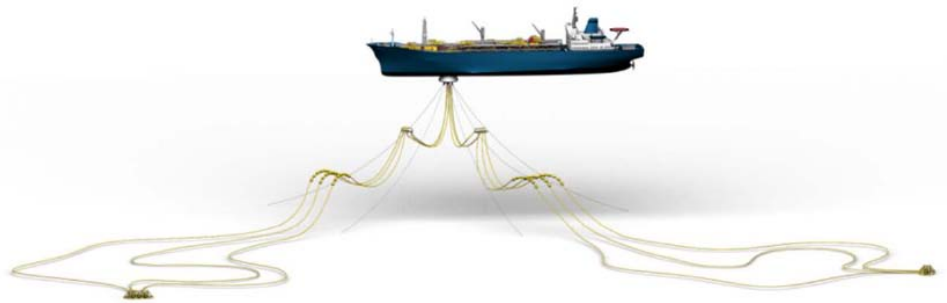


DTU Mechanical Engineering

Department of Mechanical Engineering

Contents

- The Danish maritime industry – the past and the future.
- The need for engineering competences in a globalised industry.
- The T-shaped competence profile.
- The changes and initiatives at DTU.



New Reality in Denmark – Need for other Competences

Danish Maritime Industry Today

- Denmark is still a nation of shipowners (about 100 small and large).
- 4th largest in the world on operated ships.
- Owners focus on operations – not structural design.
- Engineers' job increasingly complex.
- Big lack of maritime engineers!
- **What should be the future focus of the maritime engineering education?** (operations of ships, offshore wind farms, oil and gas exploration, Arctic operations, ...)

Survey 2011

- Carried out by working group formed by industry and university partners (shipowner, engine manufacturer, consultancy, class, authority, and 2 universities).
- 13 interviews with industry.
- Workshop with 60 participants from industry.
- Report with recommendations to university and industry.

Cerup-Simonsen et al. (2011)

Conclusions and Recommendations from Survey

Conclusions:

- Industry is lacking engineers → showstopper for economic growth.
- Need for a combination of ”classic” and ”new” competences.
- Multidisciplinary and practical approach.

Recommendations to universities and industry:

1. Increased visibility of the maritime industry at the universities and in the public.
2. The maritime industry should engage itself more and earlier in the maritime engineering education

3. Value chain between research, education and industry.
4. Constant adjustment of course content at the universities in cooperation with industry.
5. University research should result in development, innovations, demonstration and research based teaching.
6. Graduates should have a T-shaped competence profile.

The T-shaped Engineer

Management	Logistics	Sustainability
Operation	Economy	Reporting
Environment	Project	Legislation

Naval Architecture
Stability
Seakeeping
Propulsion
Machinery
Wave loads
Strength of materials
Fluid mechanics
Materials science
Statistics
Etc

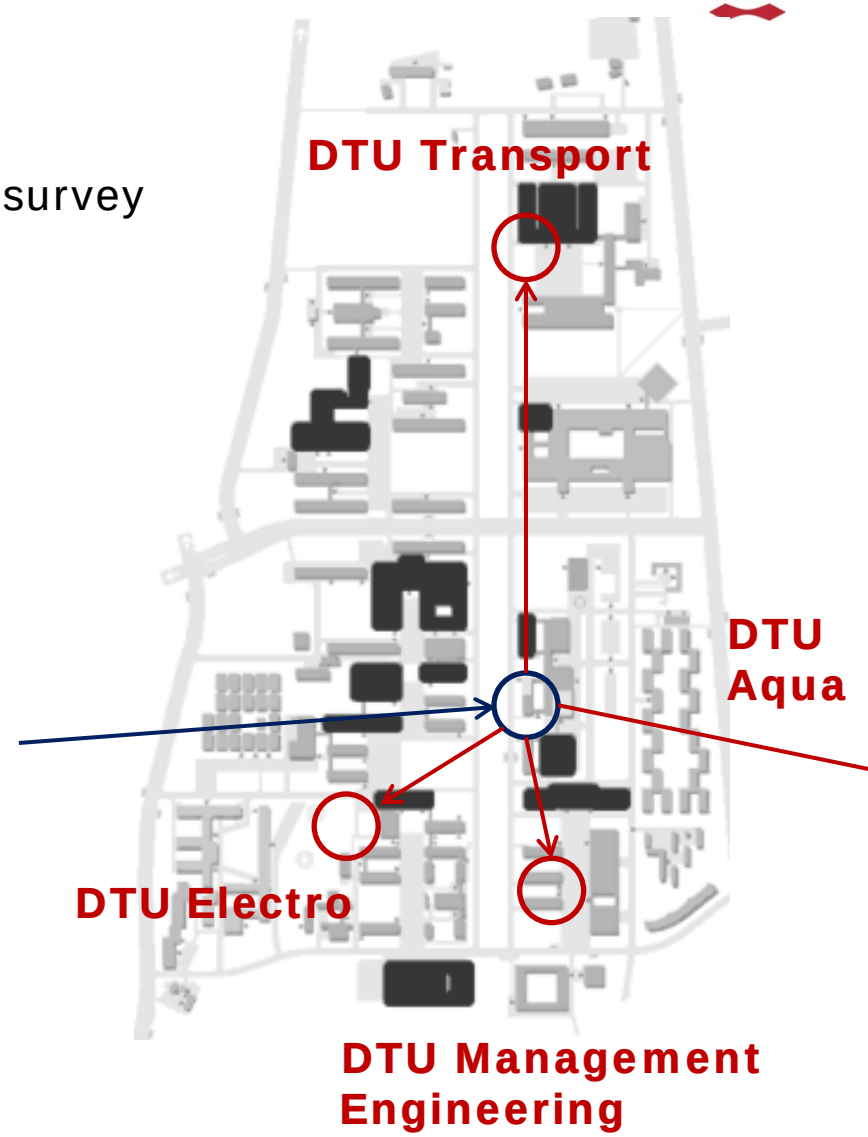
Ideally, the maritime engineer is like a multi-tool...

What did we do at DTU?

Implementation of recommendations from survey through, e.g.:

- Definition of new study tracks.
- Updated course content.
- Cooperation across departments and with industry.

Just the beginning…



Some results from the recent work...

- Defined new study tracks for BEng, BSc and MSc students (see next slide).
- Created two new courses: *Economic and Environmental Performance of Ships* and *Maritime Engineering at Sea* ("hands-on experience")
- Large increase in the number of students at MSc level.
- Arranged study trips to attract more students.
- Increased industry engagement through projects and guest lecturers.
- Introduced new software (NAPA) used by the industry in ship design.
- Started a benchmarking study with other leading maritime universities.
- New PhD positions.
- New research projects in Arctic Engineering
- Two new courses in Arctic operations

Results - curriculum

	1A	2A	3A	4A	5A	5B	2B	1B	4B	3B	Jan/ June
1 Fall	PHYS		MATH	MATH	ENG	ENG			MATH	ENG	TECH
2 Spring	PHYS	TECH	MATH	MATH		TECH			MATH		ELEC
3 Fall	MATH	CHEM	TECH				TECH			SHIP	SHIP
4 Spring	PROJ				SHIP		TECH	TECH			PROJ
5 Fall	ELEC	TECH	STAT		ELEC			ELEC	ELEC	ENG	ENG
6 Spring		ELEC			TECH	TECH	PROJ	PROJ	PROJ		

Engineering at Sea

AUSTRALIAN MARITIME COLLEGE

- The practical touch: Design tasks, crack formation, noise levels, vibrations, ship motions, ship energy consumptions and emissions.
- Attraction of students.
- Time at sea should be an integrated part of the maritime engineering education.

Study trips

- October 2012: Det Norske Veritas, Oslo Norway.
- October 2013: Visit to 3 shipyards in Singapore.

Attraction of students and funding – focus on globalisation.

Cooperation with the Industry

Engaging the industry through:

- Guest lecturers
- Role models
- Student jobs
- Cases
- Data
- Projects
- Internships

Conclusions and lessons learnt

- Network with key persons in the industry and enthusiasm is everything!
- Large companies are not necessarily the biggest contributors.
- Funding is not the problem – time is.

Acknowledgement

The authors would like to thank the Danish Maritime Fund for supporting the initiating survey and the succeeding work at DTU to update the education. The authors would also like to recognise colleagues at the Section of Fluid Mechanics, Coastal and Maritime Engineering for input and discussions in the preparation of the paper. Moreover, valuable work has been received by the ATV working group headed by Bo Cerup-Simonsen from A. P. Møller-Maersk. Finally, sincere thanks go to Australian Maritime College, in particular professor Giles Thomas and Paul Furness for sharing their priceless experiences with the authors on board FTV BLUEFIN.

The Danish Maritime Fund

Danish Academy of Technical Sciences